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ABSTRACT

This document provides an introduction to applications computer software packages that support functional managers in government and encourages the use of such packages as an alternative to in-house development. A review of current application areas includes budget/project management, financial management/accounting, payroll, personnel, supply/logistics/inventory control, library/reference, office automation/word processing, and mathematical/statistical. Topics addressed include the reasons for considering software purchase and the benefits such packages can provide. Guidance is offered on assessing whether an organization is ready to purchase a software package and on locating and using information sources, including periodicals, directories, reference services, trade newspapers, vendor literature, and organizations. An annotated list describes 40 periodicals, and a reference matrix identifies reference sources and categorizes the types of information they provide. Seven references are listed. (LMM)

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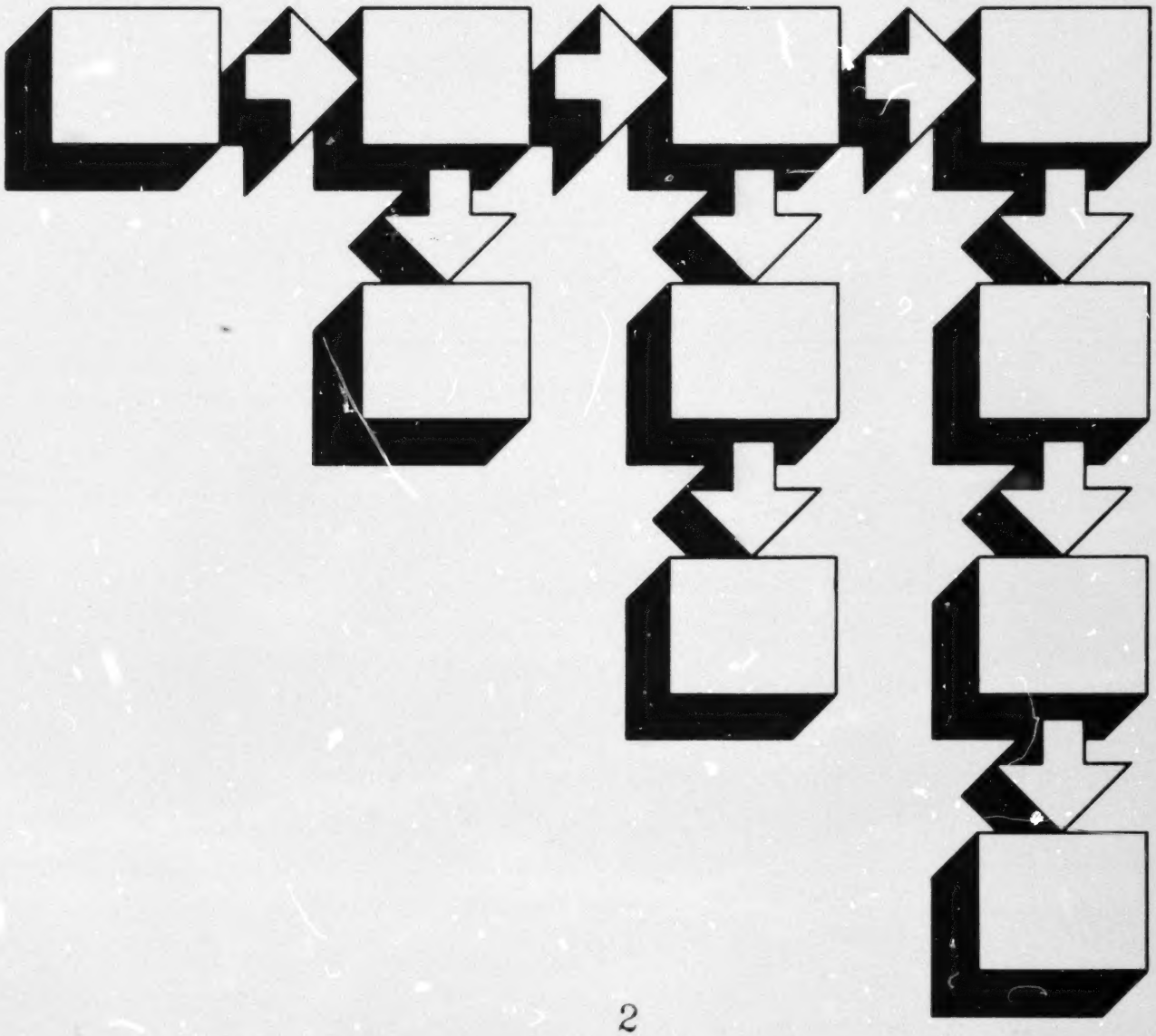
NBS Special Publication 500-114

Introduction to Software Packages



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Introduction to Software Packages

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INTRODUCTION

TO

SOFTWARE PACKAGES

S. Frankel, editor

This document provides an introduction to applications software packages. It encourages the use of software packages as an alternative to in-house development and directs potential users of software packages to sources of useful information. Application areas which are currently supported by software packages are reviewed and the benefits of software package use versus in-house development are discussed. This document includes an annotated list of publications which may be useful to potential users of software packages in searching for a package to perform a specific application, and in critically evaluating the merits of different packages.

Key words: applications software packages; off-the shelf software; packages; software applications; software packages.

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NOTE

In no case does identification of commercial products, publications or services imply recommendation or endorsement by the National Bureau of Standards, nor does it imply that the product, publication or service identified is necessarily the best available for the purpose.

1.0 INTRODUCTION

Economic conditions of small to medium-sized businesses and the availability of low cost computer hardware have significantly contributed to the growth of the data processing software package industry. This expansion, of both the software industry and the software package marketplace, has resulted in a wide variety of application packages that can be implemented on various hardware configurations. Due to this growth, the traditional concept of the inherent superiority of custom developed software has changed. Off-the-shelf software has become more widely employed as the variety and quality of packages have improved. Government has been somewhat slow, however, to capitalize on the recent software package boom.

Although the marketplace offers a large variety of software packages, some barriers are encountered in the selection of the proper package for a particular application. One barrier is the seemingly simple task of locating sources of information which describe available software packages. Due to the immense amount of information available today about the computer industry, this task presents an initial hurdle to the functional manager in Government or commercial business. The sheer number of magazines, newspapers, periodicals and journals is discouraging, especially when the computer science-oriented language and terminology may be difficult to understand. Another, even more important, barrier is the decision process involved in effectively and efficiently choosing a package. This process is not simple. Thorough planning is required before an appropriate acquisition can be made.

1.1 Scope

The National Bureau of Standards' Institute for Computer Sciences and Technology (ICST) is developing guidance for use by Government personnel who are considering the purchase of off-the-shelf software products. ICST has been assisted in their efforts by Science Applications, Inc. (SAI). This document, produced by SAI, can be used as a reference document or directory. It contains information about the types of software packages which are available, the reasons for considering the purchase of a software package, methods for locating sources of information which describe software packages, and ways to effectively use this available information.

A subsequent document is planned, which will describe a decision process for evaluating and selecting the best package for a specific application.

The types of software packages considered in this document include those that support functional managers in Government. These managers direct functions which are typically performed by most organizations (either Government or private business sector), such as personnel and project management, administration, budget and financial management, and inventory control. These functions are commonly considered end-user applications. They include such traditional applications as accounting and payroll, but have expanded rapidly in recent years also to include such diverse functions as word processing and office automation. The functional application areas listed in Table 1 will be discussed in this guide.

Table 1 - ADP Applications

Budget management
Project management
Financial management
Accounting
Payroll
Personnel
Supply/logistics/inventory control
Library/reference
Office automation/word processing
Mathematical/statistical

Not considered in this document are software packages which enhance the performance of the data processing system itself, such as system software packages and software tools for the data processing staff. These types of packages are discussed in NBS Special Publication 500-88 [HOUG82]. The many home and hobby computer applications available for microcomputers are also not considered.

The information contained in this guide was obtained from current editions of periodicals and other reference materials. In such a rapidly expanding field as software packages, information becomes obsolete very quickly. Therefore, this document concentrates on the process that should be followed in selecting a package and the sources of information which can be explored in this process. Specific examples are kept to a minimum and are only provided to

illustrate the recommended process. There is no intention of rating current packages or of endorsing any one package over another in this guide.

Much of the explosion of package availability in the marketplace is due to the advent of low cost microcomputers. This document is not limited to any specific computer size nor to any particular size of off-the-shelf package. The processes and references discussed in this guide apply to the selection of software packages which are available for mainframe computers, as well as microcomputers.

This document is intended for a broad audience: managers, users, and computer personnel of diverse backgrounds and levels of expertise, who are considering ways to provide computerized support to their organizations.

1.2 Format

This document contains three chapters, as shown in Figure 1. Chapter 1.0 includes a general introduction and an executive summary of this document, its purpose and intended audience. Chapter 2.0 defines application software packages, discusses the various ADP application areas for which packages are available, describes the benefits software packages can provide and provides guidance on how to assess whether or not an organization is ready to purchase a software package. In Chapter 3.0, techniques for obtaining information on available software packages are presented. These techniques provide potential users with details ranging from where to look for information to the usefulness of various types of services.

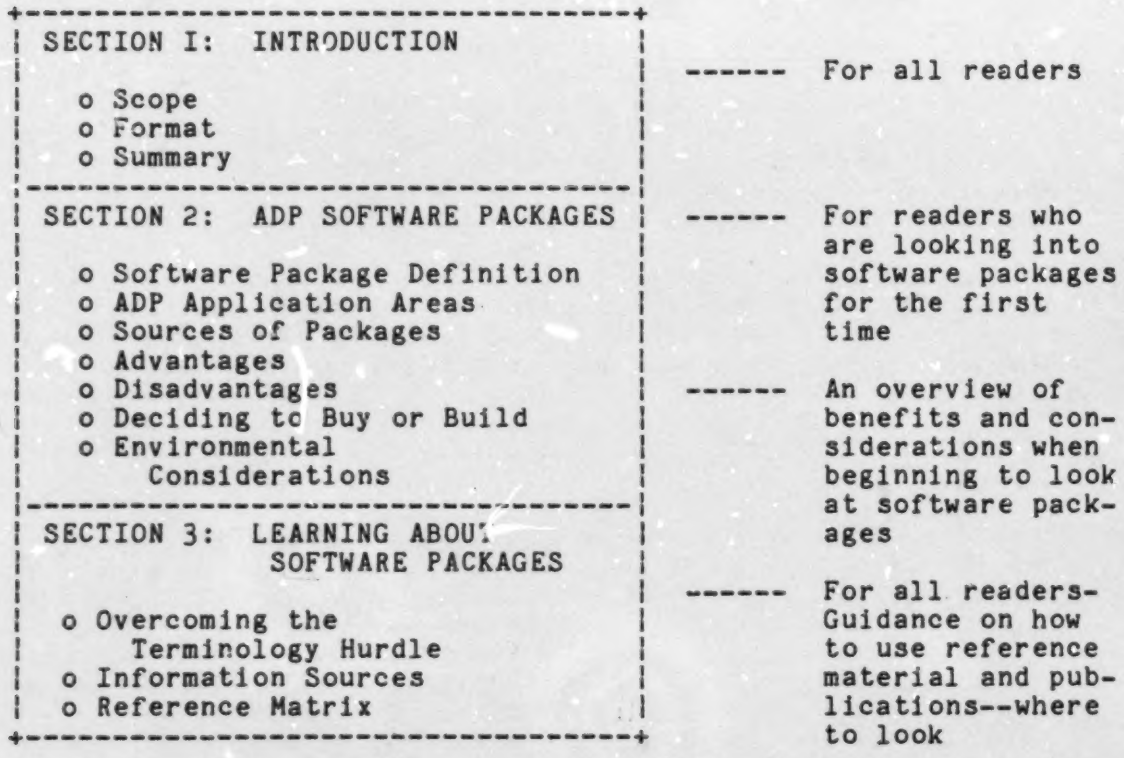
1.3 Summary

1.3.1 Purpose of this document

The goal of this document is twofold. First, it discusses the option of solving automation/modernization problems with off-the-shelf software packages. Second, it provides useful, practical, and easily-accessible information about sources of information on available software packages.

The format and style of this document are oriented toward assisting functionally-oriented Government managers in making decisions about whether a software package can meet their requirements. The data is presented in a stepwise, tutorial style that emphasizes relevant and pragmatic points

concerning the pros and cons of off-the-shelf software. Case studies are presented to illustrate these points.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SECTION 2: ADP SOFTWARE PACKAGES
o Software Package Definition
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o Sources of Packages
o Advantages
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o Deciding to Buy or Build
o Environmental Considerations
For readers who are looking into software packages for the first time
An overview of benefits and considerations when beginning to look at software packages
SECTION 3: LEARNING ABOUT SOFTWARE PACKAGES
o Overcoming the Terminology Hurdle
o Information Sources
o Reference Matrix
For all readers- Guidance on how to use reference material and publications--where to look

Figure 1 - Document Format

1.3.2 Why is this important?

Stimulated by the advent of microcomputers, the number of software packages has increased dramatically in the last few years, creating a multi-billion dollar market. Predictions for future growth range from 25% to 50% per year. Thus, packages suitable for a specific application area are increasingly likely to be available. These packages potentially have significant benefits. The benefits typically realized are illustrated in Table 2.

Since an off-the-shelf package can be purchased and installed rapidly, return on investment can be realized more quickly than with custom program development. Experiences reported by companies reveal the expense of a package may, for example, be paid back by cost savings within one year.

Table 2 - Benefits of Software Packages

BENEFIT	EXPLANATION
Immediate Availability	Does not involve the long lead time associated with custom development of a software system.
Visible, Known Cost	The price for a software package is the quoted price, with no hidden expenses. Custom developments are often difficult to estimate, tend to realize overruns, and associated maintenance costs are usually higher.
Lower Cost	The price of off-the-shelf software is lower because development costs may be spread among a number of users. It is typically much lower than the cost of a custom development. This applies to purchase price, and training and maintenance costs as well.
Documentation	Software packages come with user documentation, which can be read before purchase. Poor documentation is one of the typical failings of a custom development.
Reliability	In most cases, software packages have been well tested, used by other organizations, and some degree of confidence can be assumed in their performance. Custom developments must be tested and usually contain latent errors.

There are, of course, potential disadvantages of software packages, the primary one being that a package may not meet all of an organization's unique requirements. This disadvantage, along with the concerns of vendor stability and package reliability, are the problems most often cited by customers of software packages. Both of these concerns are becoming less significant as vendors are learning more about building packages which are flexible and easily tailored to an organization's unique environment. The expanding and profitable package market has also realized the entrance and growth of more stable vendors.

1.3.3 Why should a package be considered now?

There are several reasons why the purchase of a software package may be preferred to the in-house development of a system. Many current ADP applications systems are up to 20 years old, batch-oriented, and do not provide the productivity gains, responsiveness, and flexibility available with current technology. Custom development, however, is expensive. Most organizations have a backlog of applications that cannot be implemented because of budget constraints, personnel commitments, and the maintenance requirements of existing systems. Thus, consideration should be given to the acquisition of appropriate software packages to replace or upgrade existing services and to provide services not previously available to the organization. As a result of the rapidly expanding market for software packages, many firms have entered the competition to produce and market packaged software. This increased competition has resulted in better responsiveness to the needs of the customer, and a wider range of available applications from which to choose.

1.3.4 Conclusion

Software packages have become strong alternatives to custom development of a system and should be explored whenever a new ADP application or the replacement or upgrade of an existing system is being considered. This document, in conjunction with subsequent NBS publications, provides guidance on how software packages can be considered, evaluated, selected, and effectively implemented.

2.0 APPLICATION SOFTWARE PACKAGES

This section provides the definition of a software package, gives examples of those applications supported by software packages that can be useful to Government personnel, discusses in more detail the advantages and disadvantages of software packages, and identifies potential sources of these packages.

2.1 Software Package Definition

"Software package" is a commonly used term; however, its general, widespread usage has resulted in different meanings. The origins of software packages can be traced to the 1960s. The Program Application Library on the IBM 1400 series computer, the MARK IV package by Informatics, and the Autoflow package by Applied Data Research were some of the first software packages developed. What made them unique was that one of the goals of each of these packages was to be usable (or transportable) on a number of different types of computers [WELK80]. One of the most significant events in the evolution of software packages was IBM's decision in 1969 to "unbundle", or offer software separately from hardware, training and documentation. Software products became recognized as distinct entities, separately priced from computer hardware. Most of the initially unbundled software products or packages were system software packages. These packages were intended primarily to enhance the performance of the ADP system and included, for example, compilers, sort utilities, and data base management systems.

Prompted at least in part by the increasingly widespread use of microcomputers, the recent explosion in both the number and popularity of software packages has resulted in a number of distinct classes of packages. Software tools aid in the development of computer programs; systems packages analyze or improve the performance of a component of the system; data base management systems organize, interrogate, and update data files.

Application software packages are the class of software packages considered in this document. They both directly and indirectly support functional managers, concerned with such areas as personnel and project management, administration, inventory control, budget and financial management, word processing and office automation, and support functions typically performed in most organizations, whether Government or private sector. Specialized functions such as process control, airline reservation systems and military embedded weapon systems are not included in this definition. Systems

software packages and software tools are also not included.

Another key in this definition of software packages is that the software is developed with the intent to sell the package to a number of customers. This implies that the package has already been developed and is offered for immediate delivery. This type of package is often called off-the-shelf software, implying that no further development is required for the package to be used.

The majority of application software packages share the following characteristics:

- o They are frequently leased or licensed, rather than sold.
- o They are usually provided in object code form and restricted to certain computer systems for use.
- o User documentation is provided with the package.
- o Maintenance of the package is separately priced, but a warranty period is often provided.
- o Training is provided, perhaps separately priced.
- o Updates to the package are expected.
- o Installation of the package is sometimes provided by the vendor.

2.2 Applications

Software packages support an increasing number of functions within the business environment. Some of the major classes of packages used by private industry, and available for Federal government consideration, are discussed in this section. Not all applications are included. Rather, the following discussions are intended to illustrate the types and range of functions provided by available packages.

2.2.1 Budget/project management

The many budget/project management software packages available differ significantly in the scope of their graphics and analysis capabilities, their approach, and their target management objectives. The basic functions provided by these packages are the planning and tracking of schedules, labor, material, and subcontract costs. Summary reports show costs and task completion to date with budget and planned schedule comparisons and variance analysis. Some of the functions provided under this applications category are:

- o Pert
- o CPM
- o Job control
- o Resource allocation
- o Production planning
- o Plant management
- o Shop floor control
- o Project control
- o Capacity planning
- o Production forecasting

Data Sources [DATA83] identifies over 80 vendors of these types of packages which range in price from $125 to $100,000.

2.2.2 Financial management/accounting

Financial management/accounting software packages include accounts receivable, accounts payable, and general ledger functions. The primary benefits derived from automation of these functions are the increased timeliness of reports (such as payments due and delinquent payments), the ability to accurately and easily balance invoices against payment commitments, the continuous monitoring of assets, and the immediate recognition of problem areas.

Accounts receivable software packages attempt to maximize profits and minimize losses from bad debts. They contain customer account files, produce monthly invoices, balance accounts, process payments, issue overdue statements, trigger debt collection procedures, and provide various status reports to management. Packages differ in the extent to which data is automatically checked to insure accuracy.

Accounts payable software packages attempt to improve utilization of cash and manage payments to suppliers. They typically contain a vendor file, a scheduled payments file, a paid-but-uncleared check file, and an historical file. They provide capabilities for checking invoices from suppliers

against supplies and services received, scheduling and sending payments, reconciling payments, examining and planning commitments, maintaining an audit trail, and allocating payments to different organizational units. The amount of human intervention required to control the outflow of payments varies for these packages.

General ledger software packages typically contain a master account file, and some packages also include account posting distribution files and historical ledger data files. These packages are concerned primarily with providing management with insight into the organization's solvency, its assets-versus-liabilities status, and the performance of its various sub-organizational entities. The benefits of computerization of general ledger functions depend upon the level of detail and timing of postings to the general ledger within any specific organization. The more transaction details that are recorded, and the more often transactions are posted (accounting cycle) to the general ledger, the more advantageous computerization becomes.

Integrated accounting software packages, also called financial management systems, combine the previously mentioned accounting functions into an integrated package. They include billings, auditing, fixed assets, accounting, tax accounting, telecommunications, a control system, and interfaces to payroll, personnel, inventory, banking, and sales.

Figure 2 identifies the number of vendors, price ranges, and number of installations for these types of packages.

	Number of Vendors	Price Range	Number of Installations
Accounts Receivable	36	$1,000- 55,000	6,010
Accounts Payable	44	600- 60,000	9,231
General Ledger	30	700- 40,000	7,321
Integrated Accounting	57	2,000-700,000	24,775

Figure 2 - Financial Management Packages [AUER82]

2.2.3 Payroll

Payroll was one of the first applications to be automated when computers were introduced into the business environment. In fact, most data processing divisions originally reported to the comptroller of a business organization.

Payroll is generally a well understood function. Payroll data includes employee identification, attendance, wage rates, deductions, earnings, and cumulative earning totals. The functions performed by payroll packages include data entry and payroll output processing. Output processing usually includes the production of paychecks, a statement of earnings, and consolidated payroll reports. The packages might also include the production of periodic reports (such as W-2 forms) and management reports. Other features found in packages include employee services and benefit administration, where accounting records are kept for vested interest, allowable withdrawals, and penalties; EEO compliance; IRS compliance, including voluntary deductions, taxes, etc.; and special payroll processing such as hazardous duty, overtime, and different rate jobs. Figure 3 illustrates typical functions performed by a payroll package.

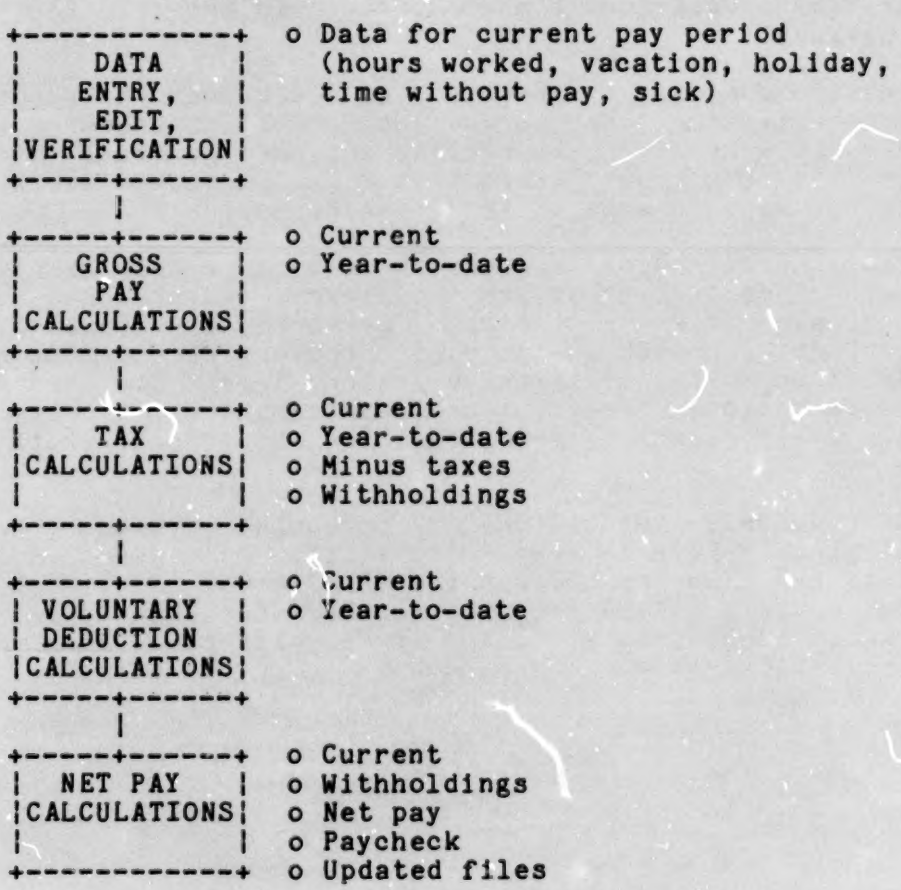

Figure 3 - Payroll Processing

Auerbach [AUER82] identifies 18 Payroll software packages. These 18 packages have been installed in over 3,500 organizations and range in cost from $600 to $14,300.

2.2.4 Personnel

The popularity of personnel software packages, also referred to as human resource management systems, has grown rapidly in recent years. These packages assist a personnel department and individual managers through the automation of employee information and the reduction in time spent completing various forms, filing forms, updating forms, etc. In addition, these packages facilitate the performance of many of the data collection and analysis tasks required by changing Government rules and regulations.

Personnel procedures differ in each organization. Thus, the flexibility of a personnel software package to meet the policies, procedures and report requirements of a specific organization should be a major concern in the selection of such a package.

Personnel systems vary in the types of functions performed. The most extensive can cover job applicant records and retired-employee records, as well as employee records. Table 3 identifies the type of data that might be maintained by a personnel package in each of these categories.

Capabilities provided by a personnel package can include requisition control, salary surveys, maintenance of chronological work histories, performance appraisals, management development, analysis of turnover, recruitment and replacement policies, affirmative action, legal actions due to discrimination, benefits and compensation, promotion, training, staff planning, and bargaining and labor relations demands.

Auerbach [AUER82] identifies 13 personnel systems that, collectively, have been installed in over 3,200 installations. They range in price from $2,000 to $148,000. Software News [LEAV83] reported results of a Data Decisions survey which identified 270 users of 6 different Personnel and Payroll packages.

Table 3

Human Resources Management Systems Data
[CAMP83] [AUER83]

JOB APPLICANT SYSTEM	EMPLOYEE SYSTEM	RETIREE SYSTEM
Demographics	Demographics	Demographics
Recruiting sources	Status	Continuing benefits
Employment history	Education	Pension plan eligibility, participation, and payment history
Compensation desired	Medical history	
Mobility	Military experience	
Special credentials	Skills	Payout options
Availability	Proficiencies	Beneficiaries
Interview data	Vacation and attendance	Social Security data
Physical exam results	Job assignment	
Job offer	Compensation	
Hiring information	Performance reviews	
Disposition code	Safety training	
	Materials/supplies	
	Career history/resume	
	Benefits	

2.2.5 Supply/logistics/inventory control

Supply/logistics/inventory control software packages vary considerably in capability, primarily because organizations vary considerably in the size and complexity of inventory keeping needs, and in the degree of automation they require in their inventory process. Any combination of the following functions can be found in these packages:

- o Requisition (demands) processing
- o Demand forecasting
- o Automated subitem ordering
- o Substitution item order processing
- o Reorder point calculation
- o Economic order quantity calculation
- o Item location
- o Inventory status

Figure 4 illustrates these functions.

Auerbach [AUER82] identifies 17 inventory control packages which range in price from $2,000 to $11,500 and account for over 2,400 installations.

2.2.6 Library/reference

Library/reference software packages provide document control, document location, inventory, order processing and subject and author referencing functions.

Data Sources [DATA83] identifies 19 different packages, ranging in price from $990 to $75,000, currently used in over 180 organizations.

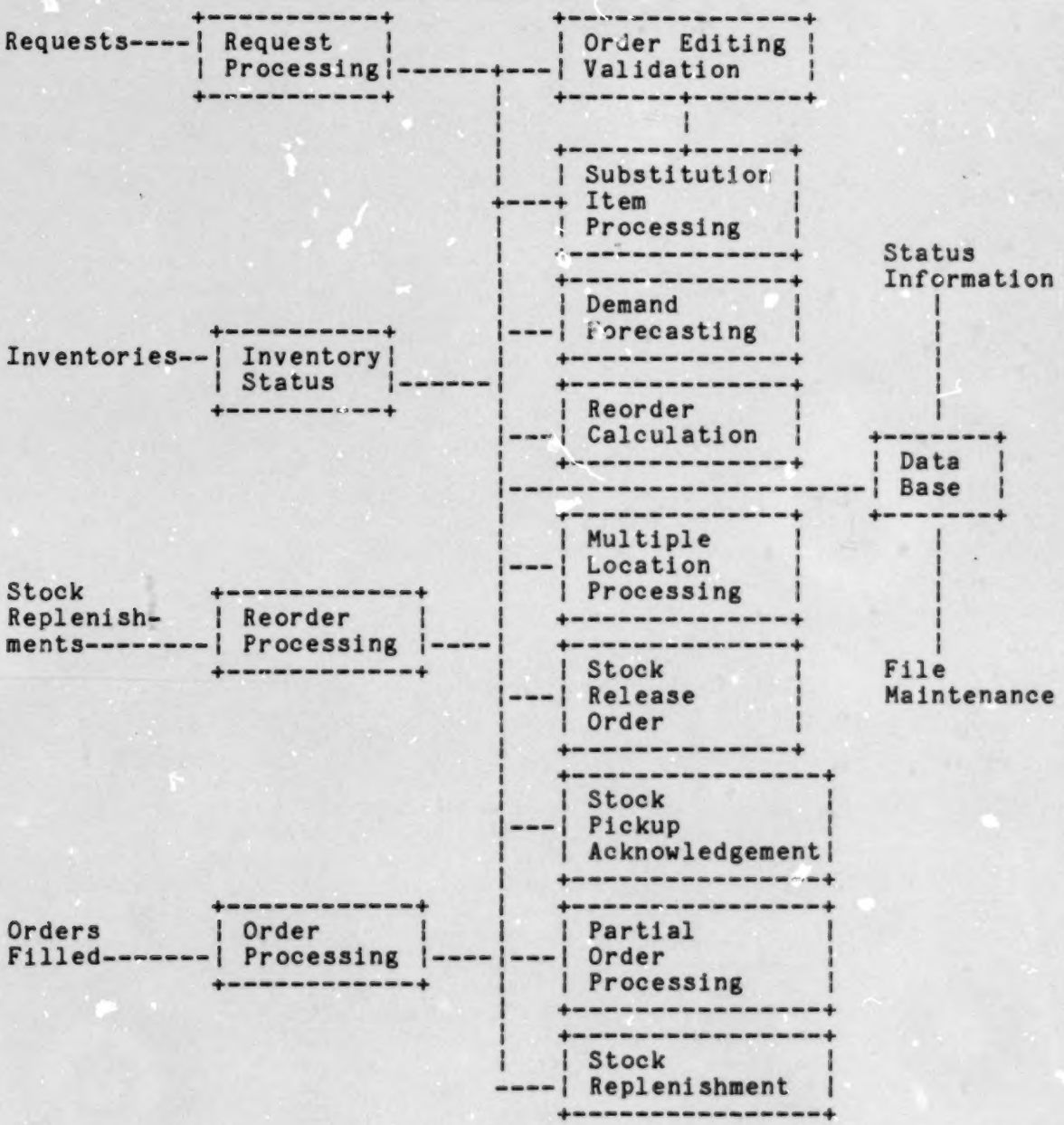

Figure 4 - Inventory Control/Order Processing Functions

2.2.7 Office automation/word processing

Office automation, also referred to as integrated office, electronic office, automated office, and word processing, has rapidly expanded the role of software packages in the office environment. The basic functions included within office automation packages are shown in Table 4. These packages often involve considerable commitment by an organization in terms of funding, as well as in procedural and environmental changes. Many office automation packages include both hardware (computers) and software. All include some form of workstation (terminal) for user interaction with the system.

Software News [MURP83] identifies 42 different office automation software packages.

2.2.8 Mathematical/statistical

Mathematical/statistical packages have been used for some time by engineers, statisticians, and mathematicians to perform standard calculations. With the advent of microcomputers and office automation, more packages of this type are appearing. They provide calculator-type capabilities for the terminal user. When linked with graphics capabilities, they become very useful for projecting data, performing analyses, and making quick mathematical calculations.

Auerbach [AUER82] identifies 20 different packages for statistical applications.

2.3 Sources Of Software Packages

The last five years has seen greatly increased software package availability. Consequently, there are many companies that produce only software packages, and are committed to providing training, service, and support. These vendors initially tended to be small businesses that got their start through one successful package. Company growth resulted in more packages in response to customer demand.

However, as the market has expanded, so have the different types of software package vendors. Table 5 describes various sources or vendors of packaged applications software.

Table 4 - Office Automation Functions [MURP83]

Major Functions	Support Provided
Word Processing	list and merge documents fill-in-the-blank forms spelling checkers reading level analyzers editors with search and replace capabilities graphics multiple font capabilities
File Processing	build new files sort, search and select records
Electronic Mail	message, memo, document, file distribution distribution to stored name list attach files to messages for distribution integrate external messages into send/receive distribution schemes annotate, reply to, or forward messages automatically request confirmation/acknowledgement of receipt prioritize message traffic
Voice Mail	voice store and forward message or memo distribution broadcast capability
Electronic Filing	document, file or mail storage and retrieval store, search, retrieve files or documents against words, phrases, subjects, authors, dates or other descriptions.
Administrative Support	schedule/calendar maintenance sign in/sign out tickler files notebooks telephone/address directories group meeting scheduling
Decision Support	numeric processing, four function math, with spread sheet, business bar/pie/line chart graphs

Table 5 - Sources of Software Packages

SOURCE	DEFINITIONS
Turnkey System Suppliers	Companies which provide an entire system -hardware and software-necessary to satisfy the particular requirements of a user.
Hardware Manufacturers	Manufacturers of computer equipment (i.e., Apple, DEC, Honeywell, IBM, etc). These manufacturers have historically supplied the systems software needed to operate the equipment (operating systems, compilers, assemblers, etc) and are beginning to offer more applications software.
User's Groups	Organizations of application programmers/users who exchange information/ programs on various software packages developed by the members. Software is often incompletely supported, documented, and tested.
Software Houses	Companies that maintain large computer programming staffs to develop both customized application software and software packages that can be sold as off-the-shelf software.
Software Brokers	Companies that serve as liaisons between customers and software suppliers.
Computer Stores	Characteristically, small companies or franchises, that develop or retail software systems primarily for computer hobbyists and small to medium businesses.

2.4 Advantages Of Software Packages

Timely availability. A software package has already been developed and is usually available immediately. When compared to development of a system, this availability can be a significant advantage. Considerable lead time is required to develop software; perhaps 24 months or more for a large system. In addition, schedule slips are typical of custom development. The benefits realized by having a package operational during this period rather than utilizing a current system while awaiting completion of development can often be the largest advantage of package acquisition.

More predictable cost. Cost is a significant advantage of software packages. Costs are visible and known, as the vendor has an established and quoted price. Purchasing a software package usually consists of purchasing a license to use the package on a limited rights basis. For example, the purchase of a package may be limited to one computer for a specified price, with a reduced price scale available for installation on additional computers. There are fewer hidden or unexpected costs, so the problems associated with estimating the costs of custom developments (which often experience overruns) are eliminated.

Lower cost. The cost of a software package is usually lower, since the vendor spreads the cost of developing the package over an expected sales volume. Custom development costs, on the other hand, are borne entirely by the one organization. In addition, the cost of developing package training material and documentation is spread among package users while the user of custom-developed software must bear the entire cost. Maintenance of off-the-shelf software packages is usually obtained through purchase of a contract to provide a specified level of service. Frequently, the cost of an initial year's maintenance service will be included in the purchase price. This lessens the workload of the in-house maintenance staff, resulting in another cost saving.

Documentation. A set of user documentation is provided by the vendor with the package and can be previewed before purchase. This documentation has evolved with use by other customers and is often professionally done. Documentation of custom developed software is notoriously poor, usually done at the last moment, and often not oriented toward the user. Good documentation is a significant advantage, as the acceptance of a system by users is often greatly influenced by how well the documentation aids them in its operation.

Reliability. Software packages tend to be more reliable than custom developed software. They are usually well tested and have been used by other organizations. Custom developed

systems must go through extensive testing before they may be used reliably, and even they often contain latent errors which may not be detected until after months or years of use.

Vendor support. Depending on the purchase contract, the package delivery may consist of either a tape and accompanying documentation or actual vendor installation. The provisions of the purchase contract will directly determine the level of support provided with delivery. If delivery is by mail, the site staff must be capable of "bringing the system up," and training staff personnel in its proper usage. In cases where the vendor provides installation support, the vendor provides a training staff that delivers and installs the package and trains resident personnel. Often, this results in excellent service at a nominal cost. Traditionally, there is a warranty period after the vendor staff leaves the facility. During this period, the vendor staff is on call to answer questions and fix any bugs that might be encountered.

Existing user base. The fact that a software package has an existing user base can be of immeasurable advantage. Current users can be surveyed about the quality and suitability of documentation, maintenance, training, and vendor reliability. In addition, on-site demonstrations of a system may be arranged, enabling potential users to judge whether the system meets their needs in terms of special features and the less quantifiable area of "user-friendliness."

As a direct result of the growth of software packages, there is often a wide variety of hardware implementations for a package. Unless a hardware configuration is quite unusual, it should not hinder implementation of an appropriate package. Thus, the main criterion upon which the selection of a package should be based is how well the functional capabilities of the package meet user requirements.

2.5 Disadvantages Of Software Packages

Functional requirements. Buying a software package is not without pitfalls and hazards. Statement of user requirements in a form that can result in selection of an optimal package is a difficult, multi-step procedure. Only after the user requirements have been stated and matched to achieve the best fit to a package can success be insured. Insuring that a package meets the specific requirements of an organization is critical to its successful implementation. In contrast, a developed system can be built to the specific requirements of an organization.

Flexibility. Environments, laws, policies and procedures constantly change and a software package must be adaptable to these changes. The flexibility which, if anticipated, can readily be built into a custom developed system, must be insured in a purchased product. This need can be handled two ways. First, the vendor can be held responsible for making necessary changes. Most vendors will do this for a fee, or may issue updates based on known changes in federal or state regulations and laws as part of their service. Second, the purchasing organization may assume responsibility for making changes. Usually, however, a software package is purchased in a form that does not easily permit changes. This form is called object code (as opposed to source code). If a user insists on changes, the vendor may withdraw all support for future package modification and void the maintenance contract. In many cases, this situation is being resolved by the marketplace. With a more competitive market and more reputable vendors, there is a wider selection of packages, packages are more adaptable and vendors are more willing to work with a customer.

Vendor reliability. It is important when selecting a package to insure that the vendor is well established and committed to the product. This problem is not as relevant to in-house custom developments since an in-house development staff is readily available for support.

Conversion. A problem that can occur with installation of a new software package is underestimation of the magnitude of adjustment to the conversion or transition to a new package. The euphoria that commonly sets in after the package is selected and purchased contributes to the masking of the sheer magnitude of the conversion and learning tasks. Needless to say, this euphoria rapidly evaporates when the purchased package fails to perform to expectations. Using perspective in the selection and acquisition process usually prevents underestimation of the amount of effort really required to get the job done.

User acceptance. A commonly encountered obstacle along the path of successful installation is user acceptance and adaptation to the new way of performing old tasks. Although the package selected may appear to management as a best fit, lower-level staff members may be required to significantly alter specific task routines. Usually, when a software package is purchased, the users are required to arrange current operational procedures so they are compatible with the software. The skill with which the package was selected determines the level of effort required for installation of the package. Most commercially available packages allow some flexibility in functional definitions; however, the user must expect and adapt to changes in current procedures that

may be required. Sometimes, because of the change of routine, staff members will openly exhibit resentment and hostility to the new procedures. One way to avoid resentment is to provide a proper introduction of the capabilities of the package by emphasizing the improved efficiency and elimination of dull, tedious tasks.

Unfulfilled expectations of package performance and inadequate vendor support are the most commonly encountered problems. Usually, unfulfilled expectations are due to a lack of planning by the customer. Careful consideration of vendor reliability and support prior to package purchase can be a decisive factor in the success of package implementation.

2.6 Deciding To Buy, Build Or Tailor

Before making the decision to buy a package rather than to develop software in-house, all options must be clearly defined. There is another option which should also be explored: purchasing a package and making modifications (tailoring) to insure that it sufficiently meets requirements. These modifications can be done by the vendor, or a third party, or may be performed by in-house staff. To avoid losing support from the vendor, the modifications may simply be the development of "front-end" and "back-end" interface programs which allow data entry and reports to be more conducive to internal procedures than those provided by the standard package. The basic package then remains unchanged and, therefore, continued vendor support should not be a problem.

It is important to explore these various options. The goal is to provide the best support available to the functional user within the constraints of budget and resources. The major trade-off is insuring that the package meets the user's requirements. Tailoring a package to insure that requirements are met often presents a cost-effective option.

The details of this decision process, the factors that must be considered, and the pitfalls to avoid,will be delineated in a subsequent NBS document.

2.7 Environmental Considerations

Certain ADP environments are simply more suitable for use of software packages than others. The conditions which usually indicate a climate conducive to successful package installation center around the availability of equipment and the attitude and needs of an organization's personnel. Cooperation across the board is essential, from upper management down to computer operations.

A classic candidate for probable success is the small- to medium-sized organization. Package implementations at this type of facility often have impressive results. The lower maintenance and support costs typical of packaged software are particularly valuable, because labor costs are usually a small organization's largest operating expense.

Although the following list is not exhaustive, it does provide suggestions for consideration before making a final decision.

- Is personnel productivity and work flow efficiency a concern of the organization? Is the organization's effectiveness hindered because of bottlenecks and unresponsiveness due to manual procedures or use of out-moded software systems?
- Is a computer system readily available? Is there on-line, interactive access to that system? Are upgrades expected in the near future?
- Is there a backlog of change requests to current systems?
- Will an application software package be given the required priority on that system to support its processing needs?
- Are the organization's procedures amenable to automated support?
- What will be the data entry requirements to place all of the necessary data base on-line to support operations (i.e., what will be the initial start up cost and delay)? If computerized support is currently available, what will it cost to convert current files and data for the new package?
- How much training will be required to familiarize users with the package?

- Will automation or use of a software package affect interface or communications with other operations within the organization?

The more affirmative answers given to the above questions, the more likely it is that a software package can be used effectively. The less effort and difficulty estimated for transition and training, the greater the likelihood that software package use will be cost-effective. Each environment is different, yet the many, quickly realized benefits of software packages make them an alternative that should be explored.

3.0 LEARNING ABOUT SOFTWARE PACKAGES

The task of learning about software packages can seem staggering at first. The following section is a guide to reference material which will make this task much simpler. It describes sources of information which are available; which sources are the most useful; and how to make the best use of them.

3.1 Overcoming The Terminology Hurdle

No matter which sources of information about software packages are used, understanding computer terminology is one of the first problems that those who are unfamiliar with computers will encounter. The evolution of computer science and its related fields has led to the proliferation of a special language with technical meanings that are often unfamiliar to the lay person. Some of these terms are heard quite often--for instance, almost everyone has been told at some time that he/she can't do something because "the computer is DOWN." Fortunately, many of these terms are becoming so common they are listed in recent dictionaries (for instance, the term "down time" is listed in Webster's New Collegiate Dictionary). In addition, there are a number of sources dealing specifically with the technical language of computing which may be useful. Three of those sources are:

- Computer Dictionary and Handbook, Charles J. Sippl, ed. [Howard W. Sams and Company, Inc.: 4300 West 62nd Street, Indianapolis, IN 46268]
- Encyclopedia of Computer Science, Anthony Ralston, ed. [Van Nostrand Reinhold Company, Inc.: 135 West 50th Street, New York, NY 10020]
- Dictionary for Information Processing [FIPS PUB 11-1, National Bureau of Standards]

The most important thing to remember when attempting to overcome the terminology hurdle is that the software to be purchased is intended to provide a service to its users. It should make life easier, not more complicated. The special terminology associated with computer technology need not have much impact upon the users of that technology. It is only in making sense of the available information on software packages and in dealing with vendors that understanding the special terminology is necessary.

3.2 Information Sources

A major problem encountered when attempting to select a software package is finding the information upon which to base a decision. At first, information is difficult to find, and then, when it is found, it may seem staggeringly complex--especially for a computer novice or a non-technical computer user.

There are numerous sources of information on applications software packages. The following sections discuss several of these sources and describe how to best use them. Figure 5 suggests a scenario for effective use of the different types of literature, showing at which point in the evaluation process each can be used effectively. Many of the sources which are discussed here may be found in local public and university libraries or Federal agency libraries and reference rooms.

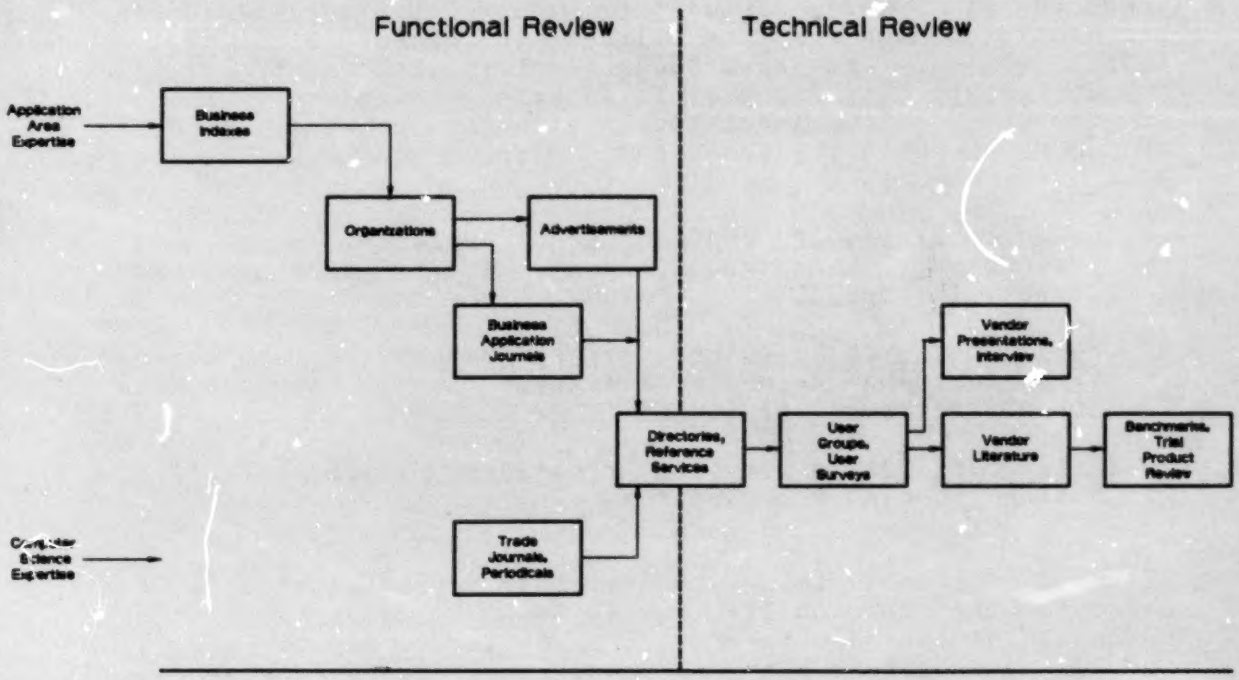

Figure 5 - Sequence of Information Review

3.2.1 Periodicals

Periodicals are one of the most widely available sources of information on software packages; the problems which confront those who are attempting to computerize specific functions; and techniques to follow when computerizing. Computer journals are not the only periodicals which print useful articles. While computer trade magazines typically have more in-depth analyses of the technical aspects of software packages (e.g., process requirements and storage requirements), application area trade magazines typically are more oriented toward the procedures a package supports. Both sources are valuable in early evaluation of various packages. When evaluating software for a specific business application area, an evaluation team that is not particularly conversant with computers might find trade journals which concentrate on the specific application area useful. For instance, to automate an accounting system, accounting magazines are probably, initially at least, the best source of information.

Valuable information, such as how current users rate packages, is often available in computer periodicals. A good example of this is the magazine Datamation, which provides a yearly users' survey of software packages. In addition, some periodicals publish articles which give tips on where to buy software. Some of them also reference additional sources of software package information.

While trade journals are good sources of information on computerizing specific functions, they are unlikely to have articles on computing in each edition. Therefore, it is best to make use of periodical indexes. Two indexes which are especially useful are:

- Business Index [Information Access Corporation: 404 6th Avenue, Menlo Park, CA 94025]

  Business Index is provided on microfilm. Listings are filed alphabetically by subject headings and by magazine titles. Business Index includes listings from 640 periodicals (approximately 90,000 articles per year).

- Business Periodicals Index [H. W. Wilson Company: 950 University Avenue, Bronx, NY 10452]

  Business Periodicals Index is in book form. It lists magazines by subject headings followed by subheadings. In this index, which is less extensive than Business Index, but more readily available, articles on automation are usually under the heading Data Processing.

3.2.2 Directories

There are several directories available which catalog software, often according to the hardware on which it is available. Because of the explosion in sales of personal computers, most such directories are for microcomputer applications. Examples of these directories follow:

- The Apple Software Directory [WIDL Video: 5245 W. Diversey Ave., Chicago, IL 60639] Software for Apple Computers.

- Commodore Software Encyclopedia [Commodore Business Machines, Computer Systems Division: 300 Valley Forge Sp., 681 Moore Rd., King of Prussia, PA 19046] Software for Commodore Computers.

- Dataguide [Sentry Database Publishing: 5 Kane Industrial Dr., Hudson, MA 01749] Hardware, software and accessories.

- Directory of Microcomputer Software [DATAPRO: 1805 Underwood Blvd., Delran, NJ 08075] Software, updated monthly, comes with telephone inquiry service.

- International Microcomputer Software Directory [Imprint: 420 South Howes, Fort Collins, CO 80521] Software, vendor lists.

- Software Directory [Digital Research: P.O. Box 579, Pacific Grove, CA 93950] Applications and system software.

- Software Vendor Directory [Micro-Serve: P.O. Box 482, Nyack, NY 10960] Applications and system software, vendors. Also available on computer diskette.

- TRS-80 Applications Software Sourcebook [Available at Radio Shack stores] Applications software for TRS-80 computers.

3.2.3 Reference services

Services have been developed which aid in the process of sorting through the vast quantity of computer information which is available. Some of these services are computerized, while others are not. In general, they can be very useful.

Datapro is one such reference service that is well established and maintains a good reputation in the data processing community. Datapro Reports [Datapro Research Corporation: 1805 Underwood Blvd., Delran, NJ 08075] is published in a three-ring binder format and is updated monthly. The Datapro subscription fee not only includes the basic volumes of the service, but also includes updates and an inquiry service. Datapro covers a variety of subject areas related to computing. Two volumes of particular interest to software package research are the following:

- Datapro Applications Software (part of the solutions series)--especially designed for those "with line or staff responsibilities in planning, designing, programming or maintaining applications software solutions to business problems." Includes "Software Development Concepts," "How to Buy Software Packages," "Make or Buy Tradeoffs," "Selection and Acquisition," "Reliability and Vendor Support" and "User Ratings." Software packages are identified by applications area and detailed descriptions of each package are provided. Vendor lists are also provided.

- Datapro Reports on Minicomputers--provides "detailed coverage of all types of minicomputers." Includes "Software" (user's ratings) and "Computers" ("individual, detailed analyses of minicomputer and small business computer systems from all important suppliers"). These analyses include users' reactions and software information.

Another well established reference service similar to Datapro is Auerbach. Auerbach Technology Reports [Auerbach Publishers, Inc.: 6560 North Park Drive, Pennsauken, NJ 08109]. The Auerbach volume on applications software includes discussions of special problems involved in computerizing specific applications areas and lists available packages in each application area. Listings include the package price, hardware requirements, capabilities, the number of installations, date of first installation, and the address of the package developer. Some of the many application areas which are covered include:

- o Human resource management
- o Accounts receivable
- o Accounts payable
- o General ledger
- o Inventory control
- o Integrated accounting
- o General business management
- o Manufacturing
- o Banking
- o Transportation
- o Medical
- o Insurance
- o Utilities
- o Scientific/engineering

A third reference service is Data Sources. Data Sources [Ziff-Davis Publishing Co.: P.O. Box 5845, Cherry Hill, NJ 08034] is published quarterly. As with Auerbach, software packages are identified by application area and hardware compatibility. Application areas include those mentioned above and others, such as those listed below.

- o Project management
- o Legal
- o Bill of materials
- o Civil engineering
- o Health
- o Economic modeling
- o Financial analysis
- o Government (Federal)
- o Government (local and state)
- o Library services
- o Office automation
- o Professional time accounting
- o Research and survey analysis

One company which provides a customized search utilizing a computerized listing of software packages is SofSearch. SofSearch's data base includes some 30,000 software packages offered by 8,500 vendors. Provided with a description of the application, the target computer and operating system and the industry, SofSearch will perform a search and provide one page reports on each package which meets these briefly described requirements.

Table 6, the Reference Services Matrix, shows the types of information that is readily available from each of the reference services.

Table 8 - Reference Services Matrix

	HARDWARE REQUIREMENTS	SOFTWARE REQUIREMENTS	APPLICATION AREA DIFFERENTIATION	PRICES	COMPANY ADDRESSES	COMPANY PROFILES	USER RATINGS	USEFUL ARTICLES	INDEXING ARRANGEMENT
AUERBACH	X	X	X	X	X	X		X	APPLICATION AREA then PACKAGE VENDOR
DATAPRO APPLICATIONS SOFTWARE			X		X	X	X	X	APPLICATION AREA then PACKAGE VENDOR
DATA SOURCES	X	X	X	X	X	X			APPLICATION AREA then VENDOR or HARDWARE
SOFSEARCH	X	X	X						HARDWARE then APPLICATION AREA

Other sources of reference material are:

- Directory of Systems Houses and Computer Distributors [Sentry Database Publishing: 5 Kane Industrial Drive, Hudson, MA 01749]
- Computer Software Industry: A Financial and Strategic Analysis [Dun & Bradstreet Credit Services: New York, NY]
- Software News [Sentry Database Publishing: 5 Kane Industrial Drive, Hudson, MA 01749]
- Computerworld Software Buyer's Guide [C. W. Communications, Inc.: Box 880, 375 Cochituate Road, Framingham, MA 01701]
- Microcomputer Software Letter [610 Fifth Avenue, Suite 706, New York, NY 10020]

3.2.4 Trade newspapers

Newspaper articles provide a good, easily readable source of general information. Several trade newspapers which are published weekly or monthly are available. Computerworld, Software News and Information Systems News are examples. These trade newspapers have articles which announce the latest packages, and they feature advertisements and articles by users on the successes and failures of off-the-shelf software packages. Information in trade newspapers tends to be the most current available.

3.2.5 Vendor literature

Software vendor literature should be one of the last sources to use in attempting to learn about software packages. This literature is not usually as objective as the other sources identified in this section. However, it is likely to provide more specific information than any other source. Therefore, once software packages have been identified which appear to be suitable in function and quality, vendor literature should be obtained to learn even more about those packages and their features.

3.2.6 Organizations

Professional and specialized organizations often have extensive support services for members or for others interested in their area of specialization. Many organizations either have branches dedicated to computers or are themselves dedicated to computers and computing (the Institute of Electronics and Electrical Engineers (IEEE) Computer Society is one notable example). Other types of organizations include users' groups, which are affiliated with specific hardware vendors and provide information on the latest applications software for their systems.

Appropriate organizations can be found in organization indexes; through the Chamber of Commerce, a source of information about local organizations; and from software and hardware vendors, who are usually familiar with local users' groups.

One useful organization index is The Encyclopedia of Associations [Gale Research Company: Book Tower, Detroit, MI 48226]. It is an international compilation of organizations, indexed according to area of interest.

3.2.7 Gathering information from the sources

Because of the growth in the number of available software packages, an immense amount of information needs to be assimilated before any final decision in the selection of a package can be made. This document provides only a sample of available references. It should be used to direct the literature search but not constrain it. The following approach is recommended:

1. Obtain as many objective viewpoints as possible. This can be done by consulting the rated reference sources.

2. Use the reference services to identify all packages in a specific application area. Use application area trade journals to find out the procedures supported. Use the computer trade journals to find technical data.

3. After preparing a list of possible candidates, personally contact current users of the package. The vendor of a package should be able to provide the names of organizations which currently use it. Feel free to ask questions such as, "How is the support?," "What are the limitations?," "How long did installation take?" Arrange to see user demonstrations of the most promising packages.

4. The results of the current users' survey will probably reduce the number of candidate packages. Do not ignore negative user reviews. Using the reduced list, phone vendors and arrange to either visit the company or to have a salesman visit. At this stage, remember that the objectivity of information decreases. Keep all of the objective information which has been gathered from other sources in mind.

In summary, buying a software package is like making any other major investment: it pays to find objective sources of information and to shop around.

3.3 Reference Matrix And Descriptions

Table 7, the Reference Matrix, contains information about many of the sources cited by The Business Index or The Business Periodicals Index, the reference services or the other sources discussed above. The matrix identifies these reference sources and categorizes the types of information provided by each source. It is intended to serve as an aid in identifying potential sources of information and in selecting the most useful sources for the particular application.

Recently, there has been a tremendous growth in the number of computer-related publications of all types, particularly those aimed at inexperienced users. Many of these publications address specific machines or application areas. Thus, this list can only be a representative sampling of the available sources. These are not necessarily the best sources for a given application, but most of them are readily available in public libraries and in Government agency libraries or reference rooms.

Detailed descriptions of the periodicals identified in the matrix (including publisher) are provided in the periodicals descriptions section, which follows the matrix.

3.3.1 How to use the Reference Matrix

The Reference Matrix lists potential sources of information about applications software packages, indicates the types of information each source provides, and the frequency and depth of that information. These sources are rated on reference content, audience level, depth of analysis, proportion of articles directly related to computers and computing, and

whether or not the reference provides an advertisers' index (a useful tool when seeking vendor literature).

The references listed in this matrix are grouped into the following categories:

- o Periodicals
- o Reference services
- o Trade newspapers
- o Vendor literature in general
- o Users' groups in general

The arrangement of the Reference Matrix has been designed to facilitate the retrieval of either general or topic-specific information. For example, an accountant who is relatively unfamiliar with computer terminology but wishes to explore the benefits a software package might provide, would use the periodicals which are specifically accounting oriented (as shown in the Target Audience field). ADP specialists, however, are likely to make less use of business applications journals and the general articles found in newspapers and rely more heavily upon technically explicit sources of information, such as the reference services, users' groups and technical journals.

The various rating categories, in conjunction with the detailed periodical descriptions which follow this section, can be used to indicate the functional or technical periodicals which are most likely to contain articles appropriate to an application. In addition, reference services reports can be used to obtain brief descriptions of packages by trade name. Auerbach, for example, provides good overall descriptions of the applications functions in addition to providing details on the age of products and the availability of maintenance contracts. Both ADP specialists and applications area experts are likely to use the periodicals and reference services in conjunction with one another, as the type of information provided by one source builds upon information provided by the other.

REFERENCE MATRIX LEGEND

1. PERIODICAL FREQUENCY: published weekly (W), every 10 days (10), monthly (M), bimonthly (B), or quarterly (Q).

2. TARGET AUDIENCE: management, applications area specialists, ADP specialists, general business, other.

   This field should be used as an indication of the type of information generally provided in the articles. Periodicals intended for management are more likely to carry articles on make-or-buy trade-offs, how to automate, how to introduce a package into an office environment, how system usage can result in job-cost savings and how to manage the requirements effort.

   Periodicals intended for applications area specialists have articles which concentrate on the problems of automating a specific application and possible solutions to those problems. Advertisements found in these periodicals detail the specific functions of packages; for example, accounting periodicals often have advertisements which explain the simplicity of general ledger accounting when using the advertised package.

   Periodicals intended for ADP specialists are more likely to tell what hardware and operating systems a specific software package requires, to contain details on the structure of programs and to compare packages in these terms. Articles are often more concerned with technical rather than business issues.

   Periodicals intended for general business audiences usually contain articles that describe general processes, business trends, decision criteria or considerations of business personnel. Usually, such articles will not be application-area specific.

   Periodicals rated other do not fit into any of the above categories.

3. COMPUTER RELATED ARTICLES: Approximate ratio of computer-related articles to total number per issue or ALL. SPECIAL indicates that, though the general ratio is that stated, occasionally the periodical has a special issue on computing.

4. ANALYSIS DEPTH: high(H), medium(M), low(L).

   Depth is based upon technical reliability and whether discussions include examples and other specifics. If software packages are being rated or analyzed, depth is also based upon whether the functions performed, the hardware required and the flexibility of software packages are discussed. If a periodical is rated high, its articles are objective and often contain technical information. If a periodical is rated low in this field, its articles are likely to be short and very general. If rated medium, its articles are of average depth and technical detail.

5. PRODUCT COMPARISON FREQUENCY: high(H), medium(M), low(L).

   If a periodical is rated high, it means that it compares packages more often than most of the other periodicals in the matrix.

6. COST DATA FREQUENCY: high(H), medium(M), low(L).

   If a periodical is rated high, it means that it lists cost information more often than most of the other periodicals in the matrix.

7. CUSTOMER RATINGS FREQUENCY: high(H), medium(M), low(L).

   If a periodical is rated high, it means that it provides user information, such as user surveys or case studies, more often than most of the other periodicals in the matrix.

8. SOFTWARE ADS FREQUENCY: high(H), medium(M), or low(L), followed by an "A" if the software advertised is often for specific applications area packages.

9. ADVERTISERS' INDEX: yes (Y), no (N).

   Some periodicals carry an advertisers' index which lists advertisers in the current issue and usually tells how to contact them for further information.

10. NOT APPLICABLE: This field is reserved for those periodicals which seem as if they would provide good information, but which, for some reason, are not appropriate for the planned scope of this study. If a periodical is not applicable, no other field will be filled in.

Table 7 - Reference Matrix* (Page 1 of 3)

SOURCE	PERIODICAL FREQUENCY	TARGET AUDIENCE	COMPUTER RELATED ARTICLES	ANALYSIS DEPTH	PRODUCT COMPARISON FREQUENCY	COST DATA FREQUENCY	CUSTOMER RATINGS FREQUENCY	SOFTWARE ADS FREQUENCY	ADVERTISER'S INDEX	NOT APPLICABLE
PERIODICALS										
ACCOUNTANCY	M	APPLICATIONS (UK)	2:1	H					N	
ADMINISTRATIVE MANAGEMENT	M	APPLICATIONS	2:1	M-H	M-H				N	
BUSINESS WEEK	W	GENERAL BUSINESS	1:1	M-H	L				N	
BYTE	M	ADP	ALL	H	M-H			H		
CHILTON'S IRON AGE	10	OTHER	1:3	L-M	L	L	L	L	Y	
COMPUTER BUSINESS NEWS	B	MANAGEMENT	ALL	L-M	M		L	L		
COMPUTER DECISIONS	M	MANAGEMENT	ALL	M-H	H	M		H(A)	Y	
COMPUTER DESIGN										X
DATA MANAGEMENT	M	MANAGEMENT	ALL	H				H		
DATAMATION	M	ADP	ALL	H	M-H	M-H	H		Y	
DECISION SCIENCES	M	MANAGEMENT	1:1	H	L	L	L	L	N	
ELECTRONIC BUSINESS										X
HARVARD BUSINESS REVIEW	B	MANAGEMENT	1:1	M-H	L	L	M	L	N	
IEEE MICRO	Q	ADP	ALL	H	H	H		L	Y	
INFOSYSTEMS	M	MANAGEMENT	ALL	H	M-H	M-H		H		
INTERFACE	Q	MANAGEMENT	ALL	M-H	M		L	H		
INTERFACE AGE	M	MANAGEMENT	ALL	M-H	H	M		H		

* For explanations of symbols, see REFERENCE MATRIX LEGEND on preceding pages

Table 7 - Reference Matrix (Page 2 of 3)

SOURCE	PERIODICAL FREQUENCY	TARGET AUDIENCE	COMPUTER RELATED ARTICLES	ANALYSIS DEPTH	PRODUCT COMPARISON FREQUENCY	COST DATA FREQUENCY	CUSTOMER RATINGS FREQUENCY	SOFTWARE ADS FREQUENCY	ADVERTISER'S INDEX	NOT APPLICABLE
PERIODICALS (CONT'D)										
INTERFACES	B	MANAGEMENT	5:1	M-H	L	L	M	L	N	
JOURNAL OF ACCOUNTANCY	M	APPLICATIONS	NONE					M(A)		
JOURNAL OF SMALL BUSINESS MANAGEMENT	Q	GENERAL BUSINESS	1:5 SPECIAL	M	L	L	L	NONE	N	
JOURNAL OF SYSTEMS MANAGEMENT	M	ADP	ALL	M	L	L	L	L	N	
MANAGEMENT ACCOUNTING	M	MANAGEMENT & APPLICATIONS	1:5 SPECIAL	M-H				M(A)		
MANAGEMENT REVIEW										X
MANAGEMENT SCIENCE										X
MANAGEMENT TODAY	M	MANAGEMENT (UK)	1:5	M-H						
MICROCOMPUTING	M	ADP	ALL	M	L	M	L	L	Y	
MINI-MICRO SYSTEMS	M	ADP	ALL	M	M	M		L		
MODERN OFFICE PROCEDURES	M	GENERAL BUSINESS	3:1	M	L	L	L	L	N	
THE OFFICE	M	MANAGEMENT	4:1	M	M	L	L	L	N	
OUTPUT	M	MANAGEMENT	ALL	M-H	M	M		L	N	
PERSONAL COMPUTING	M	OTHER	ALL	M	L	L-M		L	Y	
PERSONNEL ADMINISTRATOR	M	APPLICATIONS	1:6	M				L-M	N	
PERSONNEL JOURNAL	M	APPLICATIONS	1:3	M	L	L	L	L		

Table 7 - Reference Matrix (Page 3 of 3)

SOURCE	PERIODICAL FREQUENCY	TARGET AUDIENCE	COMPUTER RELATED ARTICLES	ANALYSIS DEPTH	PRODUCT COMPARISON FREQUENCY	COST DATA FREQUENCY	CUSTOMER RATINGS FREQUENCY	SOFTWARE ADS FREQUENCY	ADVERTISER'S INDEX	NOT APPLICABLE
PERIODICALS (CONT'D)										
PERSONNEL MANAGEMENT	M	MANAGEMENT (UK)	3:7	M				M-H (A)		
PURCHASING	B	APPLICATIONS	2:1	L	L	L	L	NONE		
TODAY'S OFFICE	M	GENERAL BUSINESS	ALL	M-H	H		M	L-M		
REFERENCE SERVICES										
AUERBACH		APPLICATIONS EADP	ALL	M	H	H	H	NONE	N	
DATAPRO		APPLICATIONS EADP	ALL	M	H	H	H	NONE	N	
DATA SOURCES		APPLICATIONS EADP	ALL	L	L	H	L	H	Y	
INFOSEARCH		APPLICATIONS EADP	ALL		L			L		
NEWSPAPERS										
BARRON'S	W	GENERAL	1:5	M	L	L	M	L	N	
COMPUTERWORLD	W	MANAGEMENT ADP	ALL	M	M	L	L	H	Y	
MERCHANDISING										X
SOFTWARE NEWS	M	GENERAL BUSINESS	ALL	M	M	M	M	M-H	Y	
VENDOR LITERATURE		GENERAL		L	L	L	M			
USERS GROUPS	M	APPLICATIONS EADP	ALL	M	L	L	L	L	N	

3.3.2 Periodical descriptions

The following section provides detailed descriptions of the periodicals

Accountancy [The Institute of Chartered Accountants in England and Wales: 56/66 Goswell Road, London, England EL1B 7LD - American distributors: Expediters of the Printed Word LTD.: 527 Madison Avenue, Suite 1217, New York, NY 10022]

A British publication which often includes articles on the computerization of accounting practices. Articles are of high depth. One to two articles per issue are related to computerization. Published monthly.

Administrative Management [Geyer-McAllister Publications, Inc.: 51 Madison Avenue, New York, NY 10010]

This periodical contains an average of two computer articles and one article on new technologies per issue. Sample titles include: "A Buyer's Guide to Word Processing Software," by Alan Hoffberg, Contributing Editor; "What You Get With a '90-Day Trial'," by Patrick Flanagan; "Superminis: In the Mainstream of Business DP," by Randi T. Sachs, Associate Editor; "Software for Sorts, Retrieval and Other Filing Tasks," by Bonnie Canning and Karen Michaels. Published monthly.

Barron's [Dow Jones and Co.: 200 Burnett Road, Chicopee, MA 01021]

This periodical is published in a newspaper format and contains a few articles of moderate depth on computers and advertisements for computers. Published weekly.

Business Week [McGraw-Hill, Inc.: P.O. Box 506, Hightstown, NJ 08520]

This magazine contains an average of one computer article per issue. All articles are business-related. Most articles are on how to more effectively use a current system, rather than on initial selection of a system. Published weekly.

Byte [Byte Publications Inc.: 70 Main St., Peterborough, NH 03458]

This monthly magazine is subtitled "The Small Systems Journal." Most articles are on computers (approximately 98%) with about half of the articles on hardware and half on software. About 60% of the advertisements are for hardware, 40% for software. Example articles are on how to select a text editor, and "Adapting Microcomputers to Wall Street." Issues are very long, averaging about 550 pages. Published monthly.

Chilton's Iron Age [Chilton Company: Wayne, PA 19089]

Chilton's Iron Age is subtitled "The Magazine for Metalworking Management." It contains some articles on computing and a few advertisements for computers. Articles are of low to medium depth. Chilton's Iron Age includes an advertisers' index. Free to qualified managers in US metal-working companies. Published every 10 days.

Computer Business News [C. W. Communications Inc.: P.O. Box 880, 375 Cochituate Rd., Framingham, MA 01701]

This newspaper-format magazine is subtitled "The Newsweekly for the OEM Community." All articles are in some way related to computers. The focus is on marketing computers and computer industry investment information. A majority of articles and advertisements relate to hardware. Articles are of medium to low depth. A software applications directory is included annually. Published bi-monthly.

Computer Decisions [Hayden Publishing Co.: 50 Essex St., Rochelle Park, NJ 07662]

This magazine is subtitled "The Management Magazine of Computing." The magazine includes departments which appear in each issue such as "Snyder on Software" (including pros and cons of reviewed software), "Software" (write-ups by vendors) and an "Advertisers' Index." Example articles include: "Choosing the Right Turnkey Mini Supplier," by David Whieldon; "Office Automation Rolls Along," interview of Professor Howard Morgan; "How to Pick 'Friendly' Terminals," by David Whieldon; and "Don't Make--Buy! Support From Timesharing Services," by David Whieldon. There are many advertisements, both for hardware and business-applications software. Free subscriptions for executives of companies that deal with or use computers. Published monthly.

Computer Design [Computer Design Publishing Co.: 119 Russell St., Littleton, MA 01460]

Though a few useful articles are presented in this magazine on recent software developments, the orientation is toward hardware architecture issues and not business applications. Free subscriptions for engineers and those who manage engineers. Published monthly.

Computerworld [C. W. Communications Inc.: P.O. Box 880, 375 Cochituate Rd., Framingham, MA 01701]

This periodical, organized in a large newspaper format, is usually about 100 pages long. Many articles provide discussions of financial trends in the computer industry, while some discuss business applications. Computerworld includes many advertisements, including coupons for requesting specific information from vendors. It typically contains a software advertising section, often features special sections on software, and usually lists new product announcements. Published weekly.

Data Management [Data Processing Management Association: 505 Busse Highway, Park Ridge, IL 60068]

This magazine is business- and computer-oriented with a concentration on data management and processing. Most computer articles and advertisements are on software. Published monthly.

Datamation [Technical Publishing Company: 875 Third Avenue, New York, NY 10022]

This magazine has a business orientation and provides extensive information on all aspects of computing. User surveys of software are often included--for instance, the May 1982 issue included the "Applications Software Survey." Each edition includes an Advertisers' Index, which is an easy way to get a quick overview of what is available. Free subscriptions for qualified personnel. Published monthly.

Decision Sciences [American Institute for Decision Sciences: University Plaza, Atlanta, GA 30303]

Decision Sciences is designed for managers. On the average, one article per issue is concerned with computers. Articles contain in-depth analysis. Very few advertisements are included. Articles stress the use of behavioral, economic and quantitative methods of analysis for decision-making in public and private organizations. Published monthly.

Electronic Business [Cahners Publishing Co. Inc.: 270 Saint Paul Street, Denver, CO 80206]

Electronic Business has an electronic equipment orientation with an emphasis on test equipment. It occasionally provides application area articles.

Harvard Business Review [Subscription Service Department: P.O. Box 3010, Woburn, MA 01888]

This journal is published by Harvard Graduate School of Business Administration as part of a program in executive education. It is designed for a management audience. Approximately one article in each issue relates to computers. The depth of articles is medium to high, and the number of advertisements of any sort is low. Published bi-monthly.

IEEE Micro [IEEE Inc., Computer Society: 445 Hoes Lane, Piscataway, NJ 08854]

All articles in this magazine are on computers. Few, however, address business applications. The technical level is high, as is the depth of articles. Published quarterly.

Infosystems [Hitchcock Publishing Companies, Inc.: Hitchcock Building, P.O. Box 3007, Weaton, IL 60187]

This periodical is subtitled "The Magazine for Information Systems Managers." It includes many advertisements, both for software and hardware, and some comparison articles. Example articles include: "Programming Tools: Impacting DP Productivity," by Carol Tomme Thiel; "Keys to Successful Office Automation: Company Strategies and User Needs," by Alan G. Rockhold, Senior Editor; "Bottom Line Report: Remote Computing Services: You've Got to Watch the Meter," by Wayne L. Rhodes, Jr., Senior Editor; and "Summer Bonanza: What's New in Software Packages," by Carol Tomme Thiel, Software Editor. Published monthly.

Interface: Data Processing Management [International Computer Programs, Inc.: 9000 Keystone Crossing, P.O. Box 40946, Indianapolis, IN 46240]

All articles are on computers and many are business related. Approximately 70% of the advertisements are for software, while the other 30% are for hardware and business services. A sample article is "In House Timesharing," by Ken Ross. Free subscriptions for qualified USA residents employed by one of the industries addressed by the publication. Published quarterly.

Interface Age [McPheters, Wolfe and Jones: 16704 Marquardt Ave., Cerritos, CA 90701]

This periodical is subtitled "Computing for Business." There are numerous advertisements, though more of them are for hardware than for software. All articles have something to do with computers, with about 40% pertaining to business applications. Many reviews of new hardware systems and software packages are provided. Some package comparisons, and useful articles on where to purchase software and how to negotiate for software packages are also provided. Published monthly.

Interfaces [The Institute of Management Sciences: 345 Whitney Avenue, New Haven, CT 06511]

This magazine is designed for managers and ADP specialists. Articles are of medium to high depth. Software advertisements and product comparisons are few. Published bi-monthly.

Journal of Accountancy [American Institute of Certified Public Accountants, Inc.: 1211 Avenue of the Americas, New York, NY 10036]

This magazine does not include articles on computing. However, it does include many advertisements for packages related to accounting. Published monthly.

Journal of Small Business Management [International Council for Small Business: West Virginia University, Bureau of Business Research, Morgantown, WV 26506]

This publication has an academic orientation and each edition has a particular theme. Only about one in five issues includes an article on computerization, although one entire issue was devoted to computerization with at least 60% of that issue's articles being on computers. No advertisements for either hardware or software are included. Articles are of medium depth. Published quarterly.

Journal of Systems Management [Association for Systems Management: 24587 Bagley Road, Cleveland, OH 44138]

This journal is designed for managers. All articles are on computers. Articles are of medium depth and include such titles as "The V-Curve: A Road Map For Avoiding People Problems in Systems Changes" and "The Main-Frame Computer: A Glimpse Into the Future." Published monthly.

Management Accounting [National Association of Accountants: 919 Third Ave., New York, NY 10022]

Computer advertisements are mostly for software (primarily accounting and financial packages). Only about one in five issues contains articles on computers, but one edition was a computer special and approximately 50% of its articles were on computing. The depth of these articles is from medium to high. Published monthly.

Management Review [American Management Associations: ARACOM Division, P.O. Box 319, Saranac Lake, NY 12983]

One in twelve issues includes an article on computing, and these articles are not directed toward the issues or audience addressed in this document. Articles are often very general. Published monthly.

Management Science [Institute of Management Sciences: 146 Westminster St., Providence, RI 02903]

This periodical is highly quantitative and academic. There are few advertisements. It is not recommended as a source for software package information. Published monthly.

Management Today [Management Publishing LTD.: 76 Dean Street, London, W1A 1BU]

Management Today is a British magazine. One in five issues includes an article on computers. Articles are of medium to high depth. Published monthly.

Merchandising [Gralla Publications: 1515 Broadway, New York, NY 10036]

This magazine has a large, glossy-newspaper format. While every issue has at least one article on computers, the orientation is not toward software packages, but on computer industry marketing information. Advertisements are also marketing-oriented. Published monthly.

Microcomputing [P.O. Box 997, Farmingdale, NY 11737]

All the articles in this magazine relate to microcomputers. Some articles address business concerns. An example article is "Meet the Monthly Billing Deadline," by Sam Davis. Monthly sections include descriptions of new products and software ratings. Most advertisements focus on hardware; however, some relate to software. Published monthly.

Mini-Micro Systems [Cahners Publishing Company, Inc.: 270 Saint Paul Street, Denver, CO 80206]

All articles in this magazine deal with computers. Articles are technically detailed and are rarely geared to business concerns. Articles do include comparisons, but the major emphasis is on hardware rather than software. This magazine provides articles directly related to a Government audience. Free subscriptions for qualified individuals. Published monthly.

Modern Office Procedures [Penton-IPC: Penton Plaza, 111 Chester Ave., Cleveland, OH 44114]

Approximately three articles per issue are on word processing. Occasionally, there are other articles on some type of computing. The articles concentrate on procedures rather than on types of software. The advertisements in this magazine are more often for hardware than for software. Published monthly.

The Office [Office Publications, Inc.: 1200 Summer St., Stamford, CT 06904]

This periodical is subtitled "Magazine of Management, Equipment, Automation." It contains many articles on office automation, word processing, etc. Articles are of medium depth. More articles are on procedures than on software, but some articles do include comparisons. Advertisements for software products are included. The Office has a business orientation. Published monthly.

Output [Technical Publishing: 1301 S. Grove Ave., Barrington, IL 60010]

This magazine is subtitled "The Information Systems Magazine for the General Management User." All of its articles are related in some way to computers and to business. Advertisements are for both software and hardware; however, the overall number of advertisements in these areas is low. Articles do include comparisons, such as in the article "Choosing a Vendor For the Automated Office," by Margaret Coffey. Published monthly.

Personal Computing [Hayden Publishing Company, Inc.: 50 Essex St., Rochelle Park, NJ 07662]

Personal Computing describes the uses of personal computers. Most articles are on how to use computers more effectively in the home. Some articles address the use of personal computers for business concerns as "When the Boss Got Into Computing," by Marvin Grosswirth. Articles are of medium depth. Approximately 20% of the advertisements are for software products. Published monthly.

Personnel Administrator [American Society for Personnel Administration: 30 Park Dr., Berea, OH 44017]

Few articles are on computers. All articles are on personnel. Advertisements are for Personnel System software packages. Published monthly.

Personnel Journal [A. C. Croft, Inc.: P.O. Box 2440, Costa Mesa, CA 92626]

One in three issues has an article on computerization. One such article is "A Guide For Building a Human Resource Data System," by Vincent R. Ceriello. Published monthly.

Personnel Management [Business Publications LTD.: Audit House, Field End Road, Ruislip, Middlesex HA4 9LT]

This magazine is a British publication. It includes advertisements for Personnel System Software packages. Most advertisements represent British products. Articles are of medium depth. Published monthly.

Purchasing [Cahners Publishing Company Inc.: 270 Saint Paul Street, Denver, CO 80206]

This periodical is business oriented. It does not include computer advertisements. Every issue has something on computers, but often the depth is low. An example article is "Computers in Purchasing: Part 30," by Robert Porter and Gilbert Trill. Published bi-monthly.

Software News [Sentry Database Publishing: 5 Kane Industrial Drive, Hudson, MA 01749]

All the articles in this periodical are concerned with computers; some also discuss business concerns. This periodical is designed like a newspaper. Articles are datelined, and are of medium depth. Sample articles include "Software and the Automated Office," by John A. Murphy and "Productivity Tools Mean Better Code," by Dave Ferris. Published monthly.

Today's Office [United Technical Publications, Inc.: 645 Stewart Ave., Garden City, NY 11530]

Most articles are on computers in business applications and comparisons are often included in these articles. Advertisements generally relate to office products while some (about 40%) are for computer software. Free to administrative executives and qualified Government offices. Published monthly.

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* U. S. GOVERNMENT PRINTING OFFICE : 1984 420-997/104

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10. SUPPLEMENTARY NOTES

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☐ Document describes a computer program; SF-185, FIPS Software Summary, is attached.

11. ABSTRACT (A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here)

This document provides an introduction to applications software packages. It encourages the use of software packages as an alternative to in-house development and directs potential users of software packages to sources of useful information. Application areas which are currently supported by software packages are reviewed and the benefits of software package use versus in-house development are discussed. This document includes an annotated list of publications which may be useful to potential users of software packages in searching for a package to perform a specific application, and in critically evaluating the merits of different packages.

12. KEY WORDS (Six to twelve entries; alphabetical order; capitalize only proper names; and separate key words by semicolons)

applications software packages; off-the-shelf software; packages; software applications; software packages

13. AVAILABILITY

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